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UNIVERSITY OF ALBERTA

RELATIONSHIP BETWEEN ADMISSION AND SUCCESS IN A DIPLOMA PROGRAM IN NURSING

BY

ANJU SHARMA

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of MASTER OF NURSING

FACULTY OF NURSING

EDMONTON, ALBERTA

SPRING, 1992

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RELATIONSHIP BETWEEN ADMISSION AND SUCCESS IN A DIPLOMA NURSING PROGRAM

SUBMITTED BY: ANJU SHARMA

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF NURSING

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Date: December 18th, 1991

ABSTRACT

Researchers have reported a significant relationship between high school scores and success in a nursing program. This study examined the relationship among high school scores, nursing school scores, socio-demographic information, and success in a diploma nursing program in Edmonton, Alberta. The researcher collected available data from the student records of 170 individuals who entered the program in September 1988 and January 1989. The accuracy of the transcribed figures was checked and rechecked. Success in this study was defined as completion of the program within 96 weeks. A median score was used to differentiate the students who achieved high scores from those who earned low scores, irrespective of whether the grade was measured on a nine-point or a percentage scale. Cross tabulations were calculated for all courses in terms of their median scores and their relationship to successful and unsuccessful groups. Both t-tests and Pearson correlations were calculated. One hundred thirty-nine students completed the program in 96 weeks, while 12 students took longer than 96 weeks, 5 students were still enroled in the program at the time of data collection, and 14 students withdrew from the program. There was no

significant relationship between success and demographic data on chi-square analysis, with the exception of one variable: Only among Alberta high school graduates was there a significant relationship between successful and unsuccessful groups. When successful versus unsuccessful groups and the term of admission were examined, definite similarities were found among Fundamentals I, Pharmacology, and Nursing III; the successful group achieved higher marks in each case. And the students who entered the program in the fall term earned higher marks. Several other courses were associated only with success: Microbiology, Psychology 260, Sociology 371, Nursing 319 (Developmental Assessment), Fundamentals I, Advanced Physiology, and Nursing III. The small sample size and the limitations of the analysis may have contributed to the lack of a significant association with respect to the following variables: high school scores, program average, program GPA, and Anatomy and Physiology, Psychology 261, Advanced Physiology, Nursing II, and Nursing IV.

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CHAPTER 1

Many attempts have been made to determine ways to identify students who would successfully complete nursing programs (Backman & Steindler, 1971; Jo Baker, 1975; Krall, 1970; Reed & Hudepohl, 1985). Published articles have examined admissions criteria and socio-demographic characteristics as predictors of program success; if success could be predicted using measures available prior to students' entrance to nursing programs, knowledge of these predictive measures might be used to guide admissions procedures.

Schools that train health professionals set high admissions standards based on the assumption that such standards will produce graduates who are competent in delivering health care. Indeed, admissions criteria have become the major resource to predict those who are most likely to stay in a program after admission (Clemence & Brink, 1978). But selection procedures which depend solely on measures of intellectual capacity might ignore other attributes that are vital to a good nurse. Woodham and Taube (1986) warned that other variables such as IQ, motivation, completion of college courses, work experience in a health care setting, and life experience might also have

an impact on course grades and National Licensure Examination (NCLEX) scores.

The proposed study examined relationships among admissions criteria, socio-demographic variables, and completion of a diploma nursing program. As admissions criteria and program duration vary among schools, so, too, do measures of success. Some investigators have measured success in terms of completing the program on time (Clemence & Brink, 1978), passing the first year of a two-year program (Jo Baker, 1975), graduates' success in their first job, or passing the registration or licensure examination (Jacono, Keehn, & Corrigan, 1987). However, none of the published studies have described success in terms of the duration of a particular program. In the proposed study, success was defined as completion of the diploma nursing program within 96 weeks (essentially two years and four months) of commencement.

Purpose of the Study

This study sought to answer the following question: Is there a significant relationship among admissions criteria, socio-demographic characteristics, and the success of students in a diploma nursing program?

Operational Definitions

1. Admissions criteria: A minimum average of 60% in the mandatory, recommended, and elective subjects required for admission to the program, as documented on the student's high school transcript.
2. Socio-demographic characteristics: An individual student's personal data, including the type of applicant, age, sex, and employment experience, as elicited from the school of nursing's application form.
3. Success: Graduation from a diploma program in nursing within 96 weeks of admission, obtained from the student's record.

CHAPTER 2

Predictors of Success

No single variable has been found to be the best predictor in an academic setting. Published articles have shown that performance in high school is related to success in post-secondary education.

High School Performance

High school grades are one way of assessing an individual's performance in an academic setting; the successful completion of required courses and the level of achievement are considered important admissions criteria. Many researchers have reported higher scores in high school to be the best predictors of high scores in an undergraduate nursing program (Allen, Higgs, & Holloway, 1988; Willingham, 1974). However, individual course predictors have varied throughout the literature. English has been reported to be related to success in a diploma nursing program (Clemence & Brink, 1978; Montgomery & Palmer, 1976; Weinstein, Brown, & Wahlstrom, 1979). Oliver (1985)

reported a positive correlation between grades in high school English and the first semester nursing grade point average (GPA).

Grades in high school Biology have been shown to be significantly related to the first semester nursing GPA according to Glick, McClelland, and Yang (1986), and Oliver (1985). Other researchers have reported a significant correlation between high school Science and the successful completion of a nursing program (Clemence & Brink, 1978; Treich & Boss, 1987; Weinstein, Brown, & Wahlstrom, 1980). Whitley and Chadwick (1986) found that high school Science grades correlated with success on the US NCLEX.

In a study of the characteristics of successful students in an Ontario college nursing program, Weinstein et al. (1980) found that grades in high school Mathematics were related to success in nursing education. A study by Yess (1980) supported these findings, although his work showed a low correlation ($r = .40$, $p < .05$).

Many researchers have studied the relationship between high school GPA and success in completing nursing school. A high GPA in high school was significantly correlated with a high GPA in nursing school (Bauwens & Gerhard, 1987; Boyle, 1986; Dyer, 1987; Halpin, Halpin, & Hauf, 1976; Miller, Feldhusen, & Asher, 1968; Outtz, 1979;

Owen & Feldhusen, 1970; Safian-Rush & Belock, 1988; Sharp, 1984; Sime, 1978). However, the significant correlation reported in all studies was very low. Dell and Halpin (1984) and Tillinghast and Norris (1968) found that the high school GPA is a better predictor of success for the nursing program than for the State Board Examination (SBE). Yet, Felts (1986) found the high school GPA to be a significant predictor of pass/fail on NCLEX.

Nursing School Performance

Achievement in certain pre-nursing courses may influence success in the first year of a two-year nursing program, while performance in nursing courses relates to success either at program completion or on the licensure examination.

Many researchers have examined the relationship between successful completion of pre-nursing courses and the likelihood of successful completion of the program and passage of the SBE or NCLEX (Burgess & Duffey, 1969; Glick et al., 1986; Lewish & Welch, 1975; Schnare, 1986; Stronk, 1979; Wittmeyer, Camiscioni, & Purdy, 1971). Program completion has been correlated with success in certain pre-nursing courses, including Anatomy and Physiology (Clemence &

Brink, 1978; Quick, Krupa, & Whitley, 1985; Seither, 1980), and Psychology (Clemence & Brink, 1978). Sociology GPA was found to be positively correlated with clinical GPA by Yang, Glick, & McCelland (1987), whereas Felts (1986) demonstrated that Microbiology GPA was significantly correlated with the GPA in nursing courses.

In studying the relationship between pre-nursing GPA and clinical GPA with respect to the completion of nursing school, Yang et al. (1987) found a positive correlation between pre-nursing GPA and clinical GPA ($r = .58$, $p < .05$). Hayes (1981) and Perez (1977) reported that pre-nursing GPA was the best predictor of scores on the State Board National Licensure Examination (SBE). A few authors have used pre-nursing GPA in the social sciences to predict program success. Their studies have revealed that pre-nursing GPAs in both the social and natural sciences predicted success (Glick et al., 1986; Perez, 1977).

Jacono, Keehn, and Corrigan (1987) examined the files of 121 students who were first-time writers of the Canadian Nurses' Association Testing Service's (CNATS) examination. Findings indicated that students who were successful on the CNATS scored significantly higher marks in Microbiology ($r = .51$, $p < 0.01$).

Only a few authors have examined the relationship between the successful completion of nursing courses and success in a nursing program, by seeking a correlation between grades on theory and clinical courses and the rate of success on the national licensure examination.

All didactic nursing course grades reflected a positive relationship with SBE scores, which ranged from $r = .40$ to $r = .8462$ ($p < .05$) in several studies (Brandt, Hastie, & Schuman, 1966; Melcom, Venn, & Blausell, 1981; Richards, 1977).

Several studies have been conducted with respect to the relationship between clinical nursing courses and success on the NCLEX. In a study of 139 baccalaureate students, Yocom and Scherubel (1985) reported no significant relationship between clinical marks in Obstetrics, Psychiatry, and Public Health Nursing, and success on the NCLEX. However, as Melcom et al. (1981) reported, clinical grades are based on the faculty's assessment of the students' application of theory to practice, rather than on standard examinations. Therefore, the variations in evaluation methods in clinical courses might partially account for these results.

Nursing theory courses are related to success on the NCLEX, because their content is actually reflected on the examination. However,

academic success in a nursing program is of little value in predicting success in practice (Burgess, Duffey, & Temple, 1972; Munro, 1985; Seither, 1980).

Many researchers have studied the relationship between nursing GPA and program completion. Some have reported that students with higher nursing GPAs are more likely to successfully complete their programs (Burgess, Duffey, & Temple, 1972; Munro, 1985; Raderman & Allen, 1974). Others have reported a correlation between nursing GPAs and SBE or NCLEX with an r value ranging between .43 and .84 ($p < .05$) (Dubs, 1975; Miller et al. 1968; Yocom & Scherubel, 1985). Sands (1988) found that GPA was not a predictor of success on the NCLEX.

Previous studies have not compared individual classes to each other. Students admitted in one term of an academic year differ from students admitted in another term. Therefore, any study that compares one class to another might reveal characteristics relevant to only that term. In other words, all classes are not alike.

University Transfer Credits

Many authors have explored the possibility of a relationship between transfer credits and nursing GPAs. Miller et al. (1968) and Montgomery and Palmer (1976) reported a positive relationship. In 1988, Allen et al. found that students who attended a number of different colleges and earned inconsistent grades in more than one course were neither more nor less successful than those students who did not report their educational background.

Socio-Demographic Characteristics

Many studies have examined the relationship between students' socio-demographic background and their success. Most North American studies have demonstrated that marital status is not predictive of success in a nursing program (Raderman & Allen, 1974; Sands, 1988; Stieren, 1981). One can only speculate that North American women are more independent, which enhances their academic careers irrespective of their marital status.

"Age does not affect an individual's ability to perform, which is of particular importance because of the enrolment patterns showing an increase in age" (Felts, 1986, p. 376). Biological age does not reflect an

individual's intellectual capacity. Indeed, many researchers have found no correlation between age and program completion or success in NCLEX (Clemence & Brink, 1978; Frerichs, 1973; Hutcheson, Garland, & Lowe, 1979; Lunneborg, Olch, & deWolf, 1974; Treich & Boss, 1987; Woodham & Taube, 1986).

Not all students who are admitted to a nursing program complete it. Jo Baker (1975) and Montgomery and Palmer (1976) found that the most successful candidates are the mature students. But neither study reported their definition of "young" or "mature." However, the literature also revealed that older students (those greater than 23 years of age) were found to be more internally motivated compared to their younger counterparts (Frerichs, 1973).

Prior experience as a nurses' aide or licensed practical nurse did not correlate with SBE performance (Clemence & Brink, 1978; Frerichs, 1973; Hayes, 1981; Hutcheson et al., 1979; Schoen, 1983). Yess (1980) reported that failure to demonstrate a relationship between work experience and SBE performance might be due to the fact that licensed practical nurses found it more difficult to learn new methods and procedures, and to unlearn old teachings and methods. According to Allen et al. (1988), students with previous health care (non-nursing)

employment had lower nursing GPAs compared to those who did not have such experience, but there was no explanation for these results.

Many researchers have explored the relationship between gender and success in a nursing program. Higgs (1984) reported that females achieved significantly higher clinical and nursing GPAs. In 1988, Allen et al. found that males were more at risk for obtaining failing grades in the clinical component of nursing course work, but proposed no explanation for these results. No correlation has been shown between gender and success in a program or on the SBE or NCLEX (Munro, 1980; Oliver, 1985; Safian-Rush & Belock, 1988).

Other common admissions criteria include the submission of (a) references, (b) a health record completed by an applicant and the family physician, (c) a letter from the applicant detailing reasons for seeking admission, and (d) a questionnaire. Research has shown that references are not good predictors of success in nursing education (Allen et al., 1988; Schwirian & Gortner, 1979; Willingham, 1974). However, one must be careful in drawing conclusions from these studies, because no analysis has been performed. Similarly, there has been no research in terms of a relationship among applicant's health records, their reasons

for seeking admission, and the applicants' questionnaires in terms of their later success in a nursing program or on the licensure examination.

In summary, the successful completion of English, Math, Biology, and other Natural Sciences in high school is significantly associated with program completion. Five variables, including high school GPA, high school Science, Microbiology, pre-Nursing GPA, and college credit hours earned prior to entering the program have been identified as significant predictors of success on the nursing registration exams. Students' clinical marks and socio-demographic characteristics are not significantly associated with completing the program or passing the registration examination. However, clinical marks and socio-demographic characteristics might reveal different results in another country or culture.

Other Measures of Success

In Canada, the national licensure examination (CNATS) is conducted four times a year and is offered to those graduates who successfully completed their programs. Unsuccessful subjects are permitted a maximum of three attempts to pass the examination. Candidates require a score of 350 to "pass," which is indicative of the minimum knowledge, skills, and abilities required to provide safe nursing

care. However, knowledge of the students' scores is currently limited to the students and to the Alberta Association of Registered Nurses (AARN), a professional organization which grants registration to its members. The school of nursing receives knowledge of the number of candidates who pass or fail, but receives no information on individual candidates. Moreover, communication with graduates after program completion is difficult because they relocate. Therefore, success defined in terms of passing the national licensure examination could not be measured in this study.

Nursing students may not only fail, but sometimes they do not complete their programs. As many researchers have concluded, attrition/non-completion is multifactorial and is, therefore, virtually neither predictable nor preventable. In some cases, attrition is beyond students' control. Usually, there is more than one reason for not completing the program (Reed & Hudepohl, 1985; Stronk, 1979; Wittmeyer et al., 1971). Studies have found that those who withdrew from the program stated different reasons, including: (a) **personal or family illness** (Alichnie & Bellucci, 1981; Backman & Steindler, 1971; Reed & Hudepohl, 1985; Rootkamp, 1968), (b) **failing to maintain an adequate grade point average** (GPA) (Alichnie & Bellucci, 1981; Hill, Taylor, & Stacy, 1963;

Knope, 1979; Tillinghast & Norris, 1968), (c) **marriage** (Krall, 1970; Levitt, Lubin, & Dewitt, 1971; Rootkamp, 1968), (d) **personal dissatisfaction** (Alichnie & Bellucci, 1981; Backman & Steindler, 1971), (e) **insufficient challenge** (Backman & Steindler, 1971; Rootkamp, 1968), (f) **academic difficulty** (Backman & Steindler, 1971; Munro, 1980; Rootkamp, 1968), (g) **dislike for nursing** (Hill, Taylor, & Stacy, 1963; Krall, 1970), (h) **difficulties with one or more courses in the basic science component** (Alichnie & Bellucci, 1981; Knope, 1979), (i) **poor scholarship** (Backman & Steindler, 1971; Rootkamp, 1968), (j) **financial** (Reed & Hudepohl, 1985), (k) **perceived inability to work with people** (Knope, 1979), (l) **difficulties experienced in adjusting to the school** (Knope, 1979), and (m) **poor study habits** (Alichnie & Bellucci, 1981).

CHAPTER 3

Methodology

Research Design

The study used a correlational descriptive survey (Brink & Wood, 1988), because correlations simultaneously represent the relationship between several pairs of variables (Smith & Glass, 1987). To examine whether a correlation existed among admissions criteria, students' socio-demographic characteristics, and their success in a nursing program, the study considered subjects' academic performance throughout high school and during their nursing program, and their socio-demographic characteristics. The study was conducted at one hospital school of nursing in Edmonton.

The Sample

The School of Nursing offers a program for both regular and mature applicants. Regular applicants enter the Program before they reach 21 years of age. Mature students are 21 years of age or older upon program commencement (*School of Nursing Calendar*, 1990). The School of Nursing admitted 78 students in September 1988, and 84

students in January 1989, who graduated in December 1990 and April 1991 respectively.

Sample Selection Criteria

The study was based on the availability of the students' records. A list of the students who were admitted in September 1988 and January 1989 was obtained from the Registrar's Office. The sample consisted of 170 students. Eight students who had withdrawn for a period of time and had been readmitted to the program were included in the sample.

Protection of Human Rights

Each student who completed the Program signed a consent form agreeing to the retrieval of personal information for secondary analysis. To access appropriate students' files, the researcher obtained verbal permission from the Acting Director of Nursing in March 1990 and a letter from the Director of Nursing (see Appendix A). The University of Alberta Faculty of Nursing Ethics Review Committee also approved the study (see Appendix B). The School of Nursing granted permission for a second person to access 10% of the subjects' information. The data were retrieved after the students graduated.

To maintain anonymity, each subject was assigned a three-digit code number. A master sheet including both the code number assigned to each student and the students' names was kept in a locked file at the School of Nursing. Only the assigned code was utilized throughout the study. The master sheets were separated from the rest of the data collection sheets which were destroyed upon the study's completion. Each student file was reviewed in a designated place at the School of Nursing; students' files never left building. The researcher prepared grouped data, so the subjects' personal characteristics were not revealed through the study's findings. Making the information in their files accessible to the researcher resulted in no known risks to the subjects; neither did the study provide known direct benefits to the subjects. However, the study may help educators and administrators to plan and provide better admissions criteria that may ultimately produce successful graduates.

Admission Criteria and the Program

The School of Nursing requires a minimum grade of 60% in each academic subject for admission (***School of Nursing Calendar***, 1990). The Registrar of the School of Nursing evaluates transcripts from outside the

Province of Alberta and contacts applicants who have transcripts requiring clarification and updates with respect to Alberta equivalencies.

Regular students have successfully completed five Grade 12 subjects, including English 30 and Biology 30, at least one subject from either Math 30 or 31, and either Chemistry 30 or Physics 30. Applicants without Math 30 or 31 are required to have an average of at least 65% in Grade 10 or 11 Mathematics. Regular applicants choose their remaining two subjects from Social Studies 30, a second language at the 30 level, Math 33, or a Fine Arts 30. Mature students (students who are over the age of 21 on admission) are expected to have successfully completed English 30 and Biology 30, and three of the following grade 12 subjects: Math 30, 31, or 33, Chemistry 30, Physics 30, Social Studies 30, or a second language at the 30 level.

The program at the School of Nursing is 96 weeks in length, and includes five semesters of instruction. The program prepares graduates to work as registered nurses when they pass the Canadian Nurses' Association Testing Service's (CNATS) national licensure examination, which tests nursing competence. An annual eight-week vacation, a Christmas break, and a spring break are not included in the 96 weeks of instruction (***School of Nursing Calendar***, 1990).

A number of courses are required prior to the actual nursing courses, including Anatomy and Physiology, Psychology 260, Sociology 371, and Microbiology.

Students are expected to achieve at least 60% in each nursing course, and earn a minimum GPA of 4 at the university level. Students who fail nursing courses also take two supplemental examinations within the 96-week period; they are not permitted to continue their program if they are unsuccessful on the supplemental examinations. Upon receipt of a written request, the School of Nursing also permits students in special circumstances to discontinue their program; these students are admitted later upon receipt of an application, depending on their academic performance and on the availability of the School's facilities.

Data Collection Procedures

Data collection sheets were devised to collect students' information from their records. Data Collection Sheet 1 (see Appendix C) collected data on high school grades (in percentages) for English 30, Biology 30, Science, Physics, Chemistry, Math, and the other courses that appeared on each student's high school transcript. The high school percentages were calculated by summing the percentage scores in all

courses, then dividing the total by the number of courses. All the figures were rounded for the purpose of the study. Finally, each subject's prerequisite course percentage, calculated for admissions purposes by the Registrar's Office, was recorded as it appeared on the application form. This percentage was based on: (a) English 30; (b) Biology 30; (c) higher marks scored on one of either Math 11, 30 or 31, Chemistry 30, or Physics 30; and (d) one of either Social Studies 30, a second language at the 30 level, Math 33, or a Fine Arts course. Prerequisite course percentages were calculated based on the view that students score higher percentages in prerequisite courses than is reflected by their overall high school average. Courses other than those which were already calculated at the 30 level for admission purposes were categorized as "other courses." All of the courses taken for credits were included, while all of the courses that were audited were excluded from the analysis.

Socio-demographic information was recorded on Data Collection Sheet 2 from information that appeared on the nursing application form (see Appendix D), including the applicant's gender, the type of admission (regular or mature), and a summary of the applicant's work experience. Data Collection Sheet 2 also documented the number of weeks achieved

toward program completion, and recorded information relating to the subject's withdrawal from the program (if applicable), including the subject's reasons for withdrawal prior to completion, and whether or not the subject re-entered the program at a later date.

Data Collection Sheet 3 (see Appendix E) documented the number of credits transferred and the grades achieved in pre-Nursing courses and in Nursing I, II, III, and IV. Marks were transferred as they appeared in the students' records. For the September 1988 admissions, the GPA for pre-Nursing courses, Nursing I courses, Nursing II courses, Nursing I averages, and Nursing II averages were recorded in the students' records and were copied verbatim.

Reliability and Validity

Although admissions criteria and other tools to measure students' nursing performance differed among nursing schools, the information in each student's file was considered to be true. Attempts were made to minimize errors in transcribing information from each student's file to the data collection sheets. The researcher checked all data collection sheets against the raw data files when the data collection concluded, and any errors or differences that were identified between the study sheets and

the source documents were corrected. The students' university and nursing school scores were also checked against the transcripts.

To maximize reliability, a second person compared 100% of the data collection sheets to the source documents twice. No discrepancies were identified between the data collection sheets and the raw data.

After they were tested for accuracy, the data were coded by the researcher. All coding was verified twice, then the source data were entered on the computer. When the data entry concluded, the variations that were noted compared to the source data were edited. Finally, a second person compared 100% of the data entered on the computer to the source data. The researcher checked and rechecked the data until the computer data and source records tallied.

Data Analysis

The School of Nursing uses percentage grades. The stanine system with grade point averages is used for university courses. High school percentage scores are converted to GPAs using the scale developed by the Office of the Registrar. Content analysis was performed on available data by (a) identifying and categorizing similar courses taken by the subjects (see Appendix C), and (b) summarizing

subjects' work experience and their reasons for withdrawal prior to program completion (see Appendix D). All data such as admissions dates, dates of withdrawal, dates of readmission, dates of birth, and high school and nursing school grades were directly entered in the computer. Other data were coded and entered in the computer as follows: Regular = 1, Mature = 2; Admission year: 1988 September = 1, 1989 January = 2; Male = 1, Female = 2; Graduated from an Alberta high school: Yes = 1, No = 2. Then the Statistical Package for the Social Sciences (Spssx) was used to analyze the data as a whole and in groups to generate descriptive statistics, including frequency tabulations of all variables and measures of central tendency. Admissions criteria and terminal data were included in the frequency distribution.

All interval data, including grades in high school and nursing school, were subjected to correlation analysis. A few researchers had reported that higher marks in high school were related to higher marks in an undergraduate nursing program (Allen et al., 1988; Willingham, 1974). Based on the findings of the previous studies, a one-tailed t-test was utilized to examine whether or not higher marks in high school were related to higher marks in nursing school.

For the purpose of data analysis, the following terms were defined to examine whether or not different variables were significantly related to success. Success was defined as completion of the program in 96 weeks. The unsuccessful group had two components. The first component included all students who took more than 96 weeks to complete the program, having either withdrawn or taken a leave of absence. The second component of the unsuccessful group included those students who had withdrawn from the program and had not returned at the time of the study. Percentage scores and GPAs were utilized by taking the median of each variable to run the cross tabulation against subjects who were successful or unsuccessful, or who had withdrawn. In the cross tabulations, Yates's correction was utilized when figures were less than five.

The second part of the analysis included the Pearson correlation to examine whether or not a correlation existed among the courses. In this study, a correlation of .44 for an n of 20 was significant at the .05 level (Norman and Streiner, 1986). Finally, the t-test was used to examine whether or not groups entering the program in the two terms of the same academic year differed with respect to any of the variables

under study. A two-tailed test was utilized with the significance level set at .05 with a view that all classes are not alike.

CHAPTER 4

Findings

This chapter explores the characteristics of the sample, including an analysis of (a) the subjects' scores in high school and in nursing school, (b) their year of admission to nursing school, (c) whether or not they were Alberta high school graduates, (d) their previous qualifications prior to admission to nursing school, and (e) their work experience. This chapter includes a discussion of the number of weeks achieved toward program completion, and examines information relating to the subjects' withdrawal from the program prior to completion. These finding are followed by the findings from Chi-square analysis, t-tests, and Pearson correlations.

Characteristics of the Sample

The sample consisted of 13 males and 157 females. All 170 subjects reported their dates of birth, which ranged from 13 December 1934 to 9 January 1971. Sixty-seven subjects were classified as regular applicants (under 21 years of age), and 99 were classified as mature applicants (over 21 years of age). Forty subjects had already earned a Bachelor's degree (see Appendix F), and 28 subjects had some post-

secondary education prior to admission to nursing school (see Appendix G). One student was a physician who had emigrated from another country. With respect to the subjects' work experience, 161 subjects reported their work experience in other areas (see Appendix H). Several had been registered nursing assistants (11) and nurses' aides (14) prior to entering nursing school. One hundred fifty-one students completed the program (see Table 1); 139 finished on time and 31 withdrew.

Students Who Withdrew

Of the 31 students who withdrew from the program, 12 have since completed it, 5 are enroled, and 14 have not returned. All 31 students were asked to provide their reasons for withdrawal; only one student, who later returned, gave no reason for withdrawal from the program. Reasons for withdrawal appeared in letters to the Registrar which were filed in the students' folders. The students cited health, personal, maternity, and academic failure as reasons for withdrawal (see Table 2).

TABLE 1

Total Sample According to Success by Year of Admission

		Date of Admission	
Criteria for Success	**Sample**	**1988**	**1989**
Completed program in:	151*	76	75
96 weeks	139	70	69
more than 96 weeks	12	6	6
Continuing students	5	--	5
Withdrew, have not returned	14	6	8
Total	170**	82	88

* Includes those students who completed the program in 96 weeks or took longer than 96 weeks

** Those who completed the program, are still enroled in the program, have withdrawn, or have not returned

TABLE 2

Reasons for Withdrawal in Terms of Program Completion Status

	Completed (N=12)	Continued (N=5)	Did Not Return (N=14)	Total
Health	2	--	1	3
Personal	3	--	7	10
Maternity	2	2	--	4
Academic	4	3	6	13
Not stated	1	--	--	1
Total	12	5	14	31

In comparing the reasons for withdrawal by date of admission, more students entering in January 1989 (N=9), cited academic failure as their reason for withdrawal, compared to students indicating academic failure in the fall term (N=4). Although not significant to these findings, it is interesting that three students withdrew from their second term admission for maternity reasons while only one student from the first term withdrew for that reason.

In comparing students who cited academic failure as their reason for withdrawal, six students did not return and seven students returned to their programs. Of these seven students, four have completed the program, and three are still enroled.

Seven students who withdrew and did not return cited personal reasons for their withdrawal, while three students who later completed the program gave personal reasons for withdrawal. Two students who later completed the program mentioned health as the main reason for their withdrawal and one student withdrew for health reasons but did not return. Finally, two students who completed the program and two who are still in the program cited maternity leave as the reason for their withdrawal. Students who reported maternity leave as the reason for their withdrawal from the program all returned later (see Table 2).

No significant association was found for gender, type of applicant (regular or mature), award of education, and admission year to nursing school on the Chi-square test. There was, however, a significant association between successful and unsuccessful subjects based on where they had attended high school. Eighty-four percent of the successful subject had graduated from an Alberta high school, compared to only 68% of the unsuccessful subjects (see Table 3). Nineteen percent of the unsuccessful subjects had transcripts from outside of Alberta compared to 14% of the successful subjects.

Assessment of the High School Record

The Office of the Registrar assesses the high school transcripts of all students who enter the School of Nursing. A prerequisite course percentage score was calculated based upon five courses (English and Biology plus any other three courses). To compute the required course percentages, the grades for English and Biology were averaged with the three courses having the highest marks. The courses most frequently used to compute the percentage score were Science, Physics, Chemistry, Math, Social Studies, Microbiology, Algebra, Music, Language, and Zoology (see Table 4).

TABLE 3

The Relationship Between Nursing Students Having an Alberta High School Transcript and Success

	Alberta High School Transcript				Transcript Missing	
	Yes		No			
	N	%	N	%	N	%
Successful students*	116	(84)	20	(14)	3	(2)
Unsuccessful students	21	(68)	6	(19)	4	(13)

* $X^2 = 8.29$ df = 2 p = 0.02

TABLE 4

Prerequisite Courses Taken for Admission by Date of Admission

Courses	Sample	Admission Year		Mean	Median	Range	SD
		'88	'89				
English	166	82	82	70	70	60-93	7
Biology	166	82	82	74	72	60-97	9
Physics	46	9	18	68	68	43-86	11
Chemistry	139	51	45	69	69	42-94	10
Mathematics	164	81	81	74	72	51-95	9
Social Studies	68	34	34	68	68	43-93	8
Language	21	12	9	68	68	32-94	10
Science	4	2	2	80	82	66-89	10
Algebra	2	2	-	63	63	62-63	.7
Zoology	2	-	2	70	70	-	-
Music	1	-	1	-	-	-	-
Microbiology	1	1	-	-	-	-	-

High School Scores

English and Biology scores were not substantially different in their mean and median marks. However, there was a wide range between the highest and lowest marks achieved in both courses. The range for Biology (60%-97%) was greater than for English (60%-93%) (see Table 4).

Although the means and medians were identical for both Physics and Chemistry, there were wide ranges of scores. Math had the highest median (72) and mean (74) scores but scores ranged from 51% to 95%. Chemistry showed the widest range of scores (42%-94%) compared to either Math or Physics (see Table 4).

In terms of the optional courses, Social Studies and Language had identical means and medians but highly dispersed scores. Science had the highest mean and median scores and the smallest range of scores. Most students took French, while one student each took German and Ukrainian. A wide range of scores was noted in Language (32%-94%).

Academic Grades

Academic grades were compared for the students who withdrew and later re-entered the program and the students who withdrew but did

not return to the program. The mean scores for the mandatory courses of English and Biology were slightly different. Students who did not return had a slightly higher English mean score (72%) compared to those who did return (71%) but a lower mean score in Biology (72%) compared to the returning students (75%) (see Table 5). Two of the returning students had passed Physics, while no non-returning student had taken the subject. The Chemistry mean score for the returning students was higher (74%) than for those who did not return (70%). Students who did not return had a higher Math mean score (73%) than the returning students (71%). In comparing their medians, non-returning students achieved 69% while returning students earned a median score of 70%. Finally, the scores of the non-returning students ranged from 63% to 91% compared to a range of 61% to 92% for the returning students (see Table 5).

Twice as many returning students had completed Social Studies courses and showed the highest mean (72%) and median scores (71%), while the mean and median scores were lower for the non-returning students (65% each). By contrast, non-returning students achieved higher but equal mean and median scores (69%) in French than did returning students (64%). Moreover, non-returning students earned a

wider range in French (65%-73%) compared to the returning students (63%-65%) (see Table 5).

TABLE 5

Prerequisite Courses by Students Who Re-entered or Withdrew From Their Program

	Re-entered					Withdrew				
Courses	N	M	Med	Range	SD	N	M	Med	Range	SD
English	15	71	69	61-88	8	13	72	70	60-93	9
Biology	15	75	78	66-85	7	13	72	71	62-92	9
Physics	2	80	80	77-83	4	--	--	--	--	--
Chemistry	13	74	74	60-89	8	11	70	69	60-94	13
Math	14	71	70	61-92	9	13	73	69	63-91	9
Social Studies	6	72	71	66-76	5	3	68	65	66-73	4
French	2	64	64	63-65	1	3	69	69	65-73	4
Algebra	1	63	--	--	--	--	--	--	--	--

Nursing School Scores

During the pre-Nursing semester, students took Microbiology, Psychology 260, Sociology 371, and Anatomy and Physiology. Grades in each course were subjected to measures of central tendency (see Table 6). The mean (80%) and median scores (81%) in Anatomy and Physiology were slightly different, and the grades ranged from 60% to 98%. The calculated pre-Nursing average (based only upon the Anatomy and Physiology grades) differed from the Anatomy and Physiology mean scores simply because of the sample size and the fact that figures were rounded. The pre-Nursing average was calculated for the class that entered the program in Fall Term 1988. At the time of data collection, the 1989 class average had not been calculated.

The mean and median scores were identical in both Microbiology (7) and Psychology 260 (6), while the mean score in Sociology 371 was higher (7) than the median score (6) although the range remained the same (4 to 9) (see Table 6). The pre-Nursing GPA was calculated based on the combined scores of Microbiology, Psychology 260, and Sociology 371 and also reflects only one half of the total sample. The mean and median scores for the pre-Nursing GPA were identical (7), although the grades ranged from 4 to 9.

The first semester consisted of Fundamentals I, Advanced Physiology, Pharmacology, and Psychology 261. All students received grades in Fundamentals I, Advanced Physiology, and Pharmacology. They received a grade on the nine-point scale in Psychology 261. Students earned identical mean and median scores (77%) in Advanced Physiology, whereas they achieved identical but lower median and mean scores (75%) in Fundamentals I. Pharmacology, an important subject in nursing, revealed a lower mean of 74% compared to Fundamentals I and Advanced Physiology. The mean score in Pharmacology was the same as for Fundamentals I (75%), but the range of scores varied (Fundamentals I, 58% to 95%; Pharmacology, 53% to 98%). Grades in Psychology 261 ranged from 4 to 9 on the nine-point scale. Students earned a median grade of seven and a mean of six (see Table 6).

The average for Nursing I had a slightly higher median (80%) compared to its mean (79%), and the scores ranged from 62% to 96% (see Table 6). The GPA for Nursing I, based on the class that entered in September 1988, ranged from 5 to 9, with a mean and median of 7.

Second-term courses included Medicine and Surgery, and Nursing 319 (Developmental Assessment). Combined percentage scores were used in Medicine and Surgery and Nursing II, and the nine-point scale

was used in Nursing 319. Students achieved identical median and mean scores (6) in Nursing 319, with a range of scores from 4 to 8, while the Nursing II scores had identical mean and median scores (71%), and ranged from 58% to 87%. The average was calculated for only the September 1988 group (N=72), thus creating higher mean and median scores (74% and 73% respectively) than for Nursing II when the entire sample was considered (71% each) (see Table 6). The Nursing II GPA was also calculated for only half of the sample (September, 1988) (based solely on the grades for Nursing 319) and had a higher but identical mean and median (7) compared to the total sample for Nursing 319 (6 and 6 respectively) (see Table 6).

During the third term, students took Nursing III, a combined course consisting of Obstetrics, Paediatrics, and Psychiatric Nursing. The course grades reflected a combination of all the grades received in each part of the course. The scores on Nursing III ranged from 69% to 92%. The mean and median scores were identical (79%).

Nursing IV, taken in the fourth term, consisted of Professionalism, Management, and Complex Nursing Care. The mean and median scores were identical (74%) and the scores ranged from 62% to 93%.

The program average was calculated for all the courses in nursing school. Both the mean and median program averages were 75%. Marks ranged from 64% to 92%, a range of 28 points. All courses on the nine-point scale were also calculated into a program GPA. These marks ranged from 4 to 9 on the nine-point scale, and the mean and median scores were both seven (see Table 6).

TABLE 6

Nursing School Scores by Total Sample

Courses	Sample	Mean	Median	Range	SD
Anatomy & Physiology*	169	80	81	60-98	8
Microbiology**	167	7	7	4-9	1
Psychology 260**	169	6	6	4-9	1
Sociology**	168	7	6	4-9	1
Pre-Nursing Average*	75	81	81	62-98	8
Pre-Nursing GPA**	76	7	7	4-9	1
Fundamentals I*	165	75	75	58-95	7
Advanced Physiology*	159	77	77	55-97	9
Pharmacology*	159	75	74	53-98	10
Psychology 261**	163	6	7	4-9	1
Nursing I Average*	74	79	80	62-96	7
Nursing I GPA**	75	7	7	5-9	1
Nursing II*	159	71	71	58-87	6
Nursing 319**	158	6	6	4-8	1
Nursing II Average*	72	74	73	61-92	6
Nursing II GPA**	76	7	7	4-9	1
Nursing III*	154	79	79	69-92	4
Nursing IV*	151	74	74	62-93	5
Program Average*	151	75	75	64-92	5
Program GPA**	151	7	7	4-9	1

* All course grades are in percentiles
** All course grades are on the nine-point scale

Students Who Did Not Return

The marks of all fourteen students who withdrew from the School of Nursing were examined. Only four students had completed Nursing II and Nursing 319. All others withdrew and did not return following their first term in Nursing. Some of the students who did not return earned scores below 60% on Fundamentals I, Advanced Physiology, and Pharmacology (see Table 7). Calculated averages of 81% and 87% were found for Nursing I only for two of these students (see Table 7). One student earned a Nursing I GPA of 7. The other students who did not return achieved lower marks in both their pre-Nursing and first semester courses, yet their marks showed very wide ranges compared to those of the returning students (see Table 7).

Successful Versus Unsuccessful Groups

All high school and nursing school scores were subjected to chi-square and t-tests: Chi-square tests were utilized for all the courses to measure successful and unsuccessful groups. A t-test was computed to examine whether or not successful or unsuccessful groups showed significant differences for all courses.

The first analysis examined all scores in all courses. By the definition of success, all students who did not return, or who took longer than 96 weeks to complete their programs, were classified as

unsuccessful. The median score was selected to differentiate the students who had achieved high marks from those who earned low marks despite the form of the grade, whether it was on the nine-point or percentage scale. Then cross tabulations were created for all courses by median scores and success.

There was no statistically significant association between successful and unsuccessful groups based on high school scores on either the chi-square analysis or the t-test. The mean scores for successful and unsuccessful groups were very similar, which may account for the fact that the t-test found no statistical significance between successful and unsuccessful groups.

The second set of courses subjected to cross tabulation were scores for all courses taken at both university and the nursing school. There was a significant association between successful and unsuccessful groups for microbiology ($X^2 = 7.4$ $df = 2$ $p = 0.02$), as 50% of the unsuccessful groups scored below the median compared to 25% for successful groups. The t-test also revealed significant differences between successful and unsuccessful groups ($t = 2.19$ $df = 165$ $p = 0.03$). The successful and unsuccessful groups achieved a similar mean GPA of 7 (see Table 8).

TABLE 7

Nursing School Scores by Students Who Re-entered and Those Who Withdrew From Their Programs

Courses	Re-entered					Withdrew				
	N	M	Med	Range	SD	N	M	Med	Range	SD
Anatomy & Physiology	17	79	80	70-89	8	13	71	69	60-89	8
Microbiology	16	7	7	5-8	1	12	7	7	5-8	1
Psychology 260	17	6	6	5-8	1	12	6	6	4-7	1
Sociology 371	17	6	6	5-8	1	12	6	6	4-8	1
Pre-Nursing Average	3	76	77	69-81	6	3	73	67	64-89	14
Pre-Nursing GPA	3	6	6	5-6	1	3	6	7	4-8	2
Fundamentals I	14	73	72	64-84	7	9	69	65	58-84	8
Advanced Physiology	11	73	73	61-87	7	8	69	71	55-86	9
Pharmacology	11	72	71	61-88	9	8	69	67	53-91	10
Psychology 261	16	6	6	4-9	1	8	6	7	4-6	1
Nursing I Average	3	73	70	69-81	7	2	84	84	81-87	4
Nursing I GPA	3	6	6	5-6	1	1	7			
Nursing II	16	70	70	60-80	6	4	65	66	58-68	5
Nursing 319	14	6	6	4-7	1	4	4	4	4-5	1
Nursing II Average	3	71	69	69-76	5	1	63			
Nursing II GPA	5	5	6	4-6	1	1	4			
Nursing III	15	76	76	70-82	3					
Nursing IV	11	71	72	65-75	4					
Program Percentage Average	12	73	73	65-78	3					
Program GPA	12	6	6	5-8	1					

TABLE 8

Nursing School Mean Scores by Successful and Unsuccessful Groups

Courses	Successful	Unsuccessful	t=value		
Anatomy and Physiology*	81	76	t=3.43	df=167	p=0.01
Microbiology*	7	7	t=2.19	df=165	p=0.03
Sociology 371*	7	6	t=3.00	df=166	p=0.00
Psychology 261*	7	6	t=2.10	df=161	p=0.04
Nursing 319*	6	5	t=2.82	df=156	p=0.04
Fundamentals I*	76	71	t=3.74	df=163	p=0.00
Advanced Phys*	77	71	t=2.74	df=157	p=0.00
Pharmacology*	76	70	t=2.58	df=157	p=0.01
Nursing III*	79	77	t=2.34	df=152	p=0.02
Program Average*	76	73	t=2.18	df=149	p=0.03
Psychology 260	6	6	t=1.71	df=167	p=0.09
Pre-Nursing Average*	81	75	t=1.99	df=73	p=0.05
Pre-Nursing GPA*	7	6	t=2.16	df=74	p=0.03
Nursing I Average	79	78	t=0.33	df=72	p=0.75
Nursing I GPA	7	7	t=0.18	df=73	p=0.86
Nursing II	71	69	t=1.58	df=157	p=0.12
Nursing II Average	74	69	t=1.66	df=70	p=0.10
Nursing II GPA	7	6	t=0.69	df=74	p=0.49
Nursing IV	74	71	t=1.92	df=149	p=0.06
Program GPA	7	6	t=1.35	df=149	p=0.18

* Significantly different in mean scores on t-test

There was a significant association in the median marks between successful and unsuccessful groups for Sociology 371 on the chi-square test ($X^2=9.39$ df=2 p=0.01). Fifty-two percent of the successful students earned scores above the median compared to 21% of the unsuccessful groups, thus making the findings significant. Similarly, on the t-test, the successful group achieved a higher mean score (7) while the unsuccessful group received only a score of 6, thus constituting a significant difference (see Table 8).

In Psychology 260, 37% of the successful group scored above the median compared to 17% of the unsuccessful group, resulting in a significant association on the chi-square test ($X^2=6.56$ df=2 p=0.04). There was no significant difference between the successful and unsuccessful groups on the t-test (see Table 8).

Anatomy and Physiology, the pre-Nursing average, and the pre-Nursing GPA were not statistically associated with success on the chi-square test. However, there was a significant difference between successful and unsuccessful groups in Anatomy and Physiology on the t-test (t=3.43 df=167 p=0.00) (see Table 8). The successful group achieved 81% in Anatomy and Physiology, while the unsuccessful group scored only 76% (see Table 8). The successful group achieved a pre-

Nursing average of 81% compared to 75% for the unsuccessful group (see Table 8). Similarly, the unsuccessful subjects earned a lower mean pre-Nursing GPA of 6 while the successful group achieved a pre-Nursing GPA of 7 (see Table 8).

In Semester I, a significant association occurred in Fundamentals I as the subjects achieved a different median score ($X^2=5.06$ df=1 p=0.02). Fifty-three percent of the successful group earned scores above the median, whereas 73% of the unsuccessful group fell below the median. More students in the unsuccessful group (73% compared to 27%) achieved scores below the median compared to those in the successful group.

On the t-test, the mean scores of the two groups were also significantly different in Fundamentals I. The successful group achieved a mean score of 76% while the unsuccessful group earned only 71% (see Table 8).

There was a significant association between grades in Advanced Physiology and success ($X^2= 5.06$ df=1 p=0.02). More students in the unsuccessful group (80% compared to 48%) earned scores below the median compared to those in the successful group, while 51% of the successful group earned scores above the median.

There were also significant differences between the groups on the t-test ($t=2.74$ $df=157$ $p=0.00$) (see Table 8). In comparing the mean scores between the groups, the successful group achieved higher scores (77%) than the unsuccessful group (71%) (see Table 8).

Successful and unsuccessful groups showed significant differences in grades in Psychology 261 ($t=2.10$ $df=161$ $p=.04$) and Pharmacology ($t=2.58$ $df=157$ $p=.01$) on the t-test but not on the chi-square test. In comparing the means for both groups, the successful group achieved higher mean scores of 7 in Psychology 261, while the unsuccessful group earned only scores of 6 (see Table 8). The unsuccessful group earned a lower mean score of 70% in Pharmacology while the successful group achieved 76% (see Table 8). There was no significant association or difference in the average grade and GPA in Nursing I between the successful and unsuccessful groups on either the chi-square or the t-test (see Table 8).

In the second semester, a significant association was noted between successful and unsuccessful groups on the chi-square test for Nursing 319 ($X^2=9.4$ $df=2$ $p=.00$). Fifty-eight percent of the unsuccessful group achieved scores below the median, while only 27%

of the successful group earned scores above the median, thus making the findings significant.

There was a significant difference between the groups on the t-test ($t=2.82$ $df=156$ $p=0.04$). Considering the differences in the mean scores, the successful group achieved a higher GPA of 7 while the unsuccessful group earned only a 6 (see Table 8).

There was no association nor difference between the successful and unsuccessful groups in Nursing II, the Nursing II average, or the Nursing II GPA on either the chi-square or t-test. However, there was a significant association between success and Nursing III ($X^2=3.9$ $df=1$ $p=.05$).

In analyzing percentage scores for Nursing III, half (50%) of the successful group fell below the median and half achieved scores above the median. The unsuccessful group showed a wide variation; 80% earned below median scores compared to the 20% who were above the median. In comparing the results between successful and unsuccessful groups, 50% of the successful group and 80% of the unsuccessful group scored below the median. Similarly, 50% of the successful group and only 20% of the unsuccessful group scored above the median.

The groups also showed significant differences on the t-test for Nursing III ($t=2.34$ $df=152$ $p=0.02$) (see Table 8). The mean scores were analyzed for both the successful and unsuccessful groups. The successful group achieved a higher mean score of 79%, compared to 77% for the unsuccessful group (see Table 8). By contrast, chi-square and t-tests revealed no significant associations or differences for Nursing IV.

There was a significant difference in the program averages of the successful and the unsuccessful groups ($t=2.18$ $df=149$ $p=.03$). The successful group achieved a higher mean score of 76%, compared to the mean score of 73% earned by the unsuccessful group (see Table 8).

Chi-square and t-tests revealed no significant associations or differences between the successful and unsuccessful groups in terms of program GPA.

The unsuccessful group was then split into two sub-groups: (a) those who withdrew and did not return, and (b) those who withdrew, returned, and eventually graduated. Chi-square analysis of all required courses and prerequisites for these groups and the successful group revealed no major differences compared to the previous findings, with two exceptions. Course grades in Microbiology and Psychology 260

showed a significant association in the successful versus unsuccessful analysis, but there was no significant association when run against the groups who were successful, took longer to complete the program, and withdrew from their program.

Course Comparisons of the Two Groups of Admissions

The course scores for both high school and nursing school were compared for the students who entered nursing school in September 1988 and in January 1989. Among the mandatory courses, only Biology showed a significant difference between the two groups on the t-test ($t=3.16$ $df=164$ $p=0.00$) (see Table 9). The September 1988 group achieved a higher mean score (76%) in Biology than the January 1989 group (72%) (see Table 9). There was no significant difference between the two groups in high school English and Physics, the high school percentage, the high school GPA, or in Nursing School Anatomy and Physiology, Microbiology, Psychology 260 and 261, Sociology 371, Nursing 319, Advanced Physiology, the program Average, and the program GPA on the t-test (see Table 9).

Groups showed significant differences in both Chemistry (see Table 9) ($t=2.32$ $df=137$ $p=0.02$) and Math ($t=2.32$ $df=162$ $p=0.02$)

(see Table 9). Students entering in September 1988 achieved a mean score of 71% in Chemistry, while the group that entered in January 1989 earned a lower mean score of 67%. Similarly, the group who entered in September showed a higher mean score (75%) in Mathematics, compared to the January group's mean score of 72% (see Table 9).

TABLE 9

The Mean Scores of All Courses by Date of Admission

Courses	1988	1989	t=value		
Biology*	76	72	t=3.16	df=164	p=0.00
Chemistry*	71	67	t=2.32	df=137	p=0.02
Math*	75	72	t=2.32	df=162	p=0.02
Prerequisite Percentage*	74	71	t=2.97	df=163	p=0.00
Pharmacology*	79	71	t=5.23	df=157	p=0.00
Fundamentals I*	76	74	t=2.50	df=163	p=0.01
Nursing II*	68	73	t=5.31	df=157	p=0.00
Nursing III*	80	78	t=2.05	df=1.52	p=0.04
Nursing IV*	73	75	t=2.16	df=149	p=0.03
English	71	70	t=1.16	df=164	p=0.25
Physics	68	68	t=0.08	df=44	p=0.94
High School GPA	6	6	t=-0.43	df=143	p=0.67
High School Percentage	70	68	t=1.93	df=156	p=0.06
Anatomy & Physiology	81	79	t=1.45	df=168	p=0.15
Microbiology	7	7	t=-.72	df=165	p=0.47
Psychology 260	6	6	t=0.15	df=167	p=0.89
Sociology 371	6	6	t=1.77	df=166	p=0.08
Psychology 261	6	6	t=-.71	df=161	p=0.48
Nursing 319	6	6	t=1.67	df=156	p=0.1
Advanced Physiology	77	76	t=1.19	df=157	p=0.23
Program Average	75	76	t=-1.21	df=149	p=0.23
Program GPA	7	7	t=0.35	df=149	p=0.73

* Significantly different on t-test at 0.05

There were also differences between the two groups in prerequisite course percentages ($t=2.97$ $df=163$ $p=0.00$). Students entering in January 1989 earned a lower mean score of 71% compared to 74% for the group that entered in September 1988 (see Table 9).

In Semester I, the t-test revealed a significant difference in the two admission groups for Fundamentals 1 ($t=2.50$ $df=163$ $p=0.01$). The mean score for the September 1988 group was higher (76%) than that for the January 1989 group (74%) (see Table 9).

The groups also showed significant differences for Pharmacology ($t=5.23$ $df=157$ $p=0.00$). The September 1988 group achieved a mean score of 79% whereas the January 1989 group earned a much lower mean score of 71%.

In Semester II, t-tests revealed significant differences in Nursing II ($t=-5.31$ $df=157$ $p=0.00$) (see Table 9). Students entering in January 1989 achieved a higher mean score of 73% compared to 68% for their September 1988 counterparts.

In Semester III, a significant difference was evident between the September 1988 and January 1989 groups on the t-test for Nursing III. The group that entered in September 1988 achieved a higher mean score (80%) than the group that entered in January 1989 (78%).

In Semester IV, there was again a significant difference between the groups on the t-tests for Nursing IV ($t=2.16$ $df=1497$ $p=0.03$). The January 1989 group achieved a higher mean score of 75% compared to the September 1988 group's mean score of 73% (see Table 9).

The January 1989 group achieved a slightly higher program average mean of 76% compared to the September 1988 group (75%), while the program GPA of 6.0 was identical for both groups.

The Correlation Among Scores in Courses

A Pearson correlation was used to compute the high school and nursing school scores (see Appendix I). There was a statistically significant correlation between scores in high school English and the prerequisite course percentage ($r=.5$ $p=.00$), the Nursing II GPA ($r=.4$ $p=.00$), high school percentage scores ($r=.3$), the high school GPA ($r=.3$), the average score for Nursing 319 ($r=.3$), the pre-Nursing GPA ($r=.3$), and the grade in Nursing II ($r=.3$). All were correlated at the $p=.00$.

There was also a high correlation between grades in Biology and the following elements: the prerequisite course percentage ($r=.7$ $p=.00$), grades in high school Physics ($r=.5$), the pre-Nursing average ($r=.5$), the

average scores in Nursing I and Nursing II ($r = .5$ $p = .00$), and average scores in Chemistry ($r = .4$), Fundamentals 1 ($r = .4$), Advanced Physiology ($r = .4$), and Anatomy and Physiology ($r = .4$).

Other variables which revealed a correlation of .3 with high statistical significance were high school percentage scores, the scores in Pharmacology and Nursing II, the pre-Nursing GPA, the GPAs for Sociology, Nursing I, and Nursing II, and the program average. All of these were correlated at $p = .01$ or better.

There was a strong correlation between the scores in Physics and (a) the prerequisite course percentage ($r = .7$), (b) the scores in high school Chemistry ($r = .6$) and Math ($r = .6$), (c) the pre-Nursing average grade ($r = .6$), (d) the average scores in Nursing I and II ($r = .6$), (e) the high school GPA ($r = .5$), (f) the high school percentage ($r = .5$), (g) grades in Anatomy and Physiology ($r = .5$), (h) the pre-Nursing GPA ($r = .5$), (i) Fundamentals I ($r = .4$) and the program average ($r = .4$), (j) Advanced Physiology ($r = .3$), and (k) the scores in Nursing II and IV ($r = .3$). All were correlated at $p = .01$ or better.

The score in Chemistry was compared to the prerequisite course percentage, the high school percentage, the grade in Math, the high school GPA, the grades in Pre-Nursing Semester I, and the grades in

Semesters II, III, and IV. All of these were correlated at p=.01 or better. There was a strong relationship among the prerequisite course percentage (r=.6), the high school percentage (r=.4), the score in Math (r=.3), the high school GPA (r=.3), the score in Anatomy and Physiology (r=.3), the pre-Nursing average (r=.3), and the score in Advanced Physiology (r=.3). The score in Math did not correlate with specific courses, but it did correlate with course averages (r=.4) or GPA (r=.4), the prerequisite course percentage (r=.4), the Nursing II average grade (r=.4), the high school percentage (r=.3), the pre-Nursing average (r=.3), the pre-Nursing GPA (r=.3), the Nursing I average (r=.3), and the Nursing II GPA (r=.3 p=.00). All were correlated at p=.01 or better.

A strong correlation existed between the prerequisite course percentage and the scores in Nursing I (r=.6) and Nursing II (r=.6 p=.00), the pre-Nursing average (r=,5), the pre-Nursing GPA (r=.5), and the scores in Fundamentals I (r=.5), Anatomy and Physiology (r=.5), and Sociology 371 (r=.5), Advanced Physiology (r=.4), Pharmacology (r=.4), the Nursing I GPA r=.4), the Nursing II GPA (r=.4), and the program average (r=.4). There was also a correlation between the average prerequisite course percentage (r=.3), GPAs in Microbiology (r=.3), Psychology 261 (r=.3), and Nursing 319 (r=.3), grades in

Nursing II (r=.3), Nursing III (r=.3), and Nursing IV (r=.3), and the program GPA (r=.3). All were correlated at p=.00.

Anatomy and Physiology showed a positive correlation with the pre-Nursing average (r=1). The correlation also existed between (a) the Nursing I (r=.9) and the Nursing II averages (r=.9), (b) grades in Fundamentals I (r=.8), Advanced Physiology (r=.8), and the program average (r=.8), (c) the pre-Nursing GPA (r=.7 p=.00) (d) grades in Pharmacology (r=.6), Nursing II (r=.6) and Nursing IV (r=.6), and Nursing I and Nursing II GPAs (r=.6 p=.00), (e) GPAs in Sociology 371 (r=.5), Nursing 319 (r=.5), grades in Nursing III (r=.5), and the program GPA (r=.5 p=.00). Microbiology and Psychology 260 GPAs showed a correlation of .4, while the GPA in Psychology 261 demonstrated a lower correlation (r=.3). All were correlated at p=.00.

The pre-Nursing GPA and the Nursing II GPA were strongly correlated with the GPA for Microbiology (r=.7). There was also a strong correlation among the Nursing I GPA, the program GPA, and Microbiology (r=.6 p=.00). Microbiology was also correlated with GPAs in Psychology 260 (r=.5), Sociology 371 (r=.5), Psychology 261 (r=.5), the average grades in pre-Nursing (r=.5) and Nursing II (r=.5), the grade in Fundamentals I (r=.5), and the program average (r=.5); Microbiology

also reflected a different correlation with (a) GPAs in Psychology 260 (r=.4) and Nursing 319 (r=.4), (b) grades in Advanced Physiology (r=.4), Nursing II (r=.4), Nursing III (r=.4), and Nursing IV (r=.4), and (c) the average score in Nursing I (r=.4). Microbiology's lowest correlation was with Pharmacology (r=.3). All of these were correlated at p=.00.

Psychology 260 was correlated with Sociology 371, Psychology 261, the pre-Nursing average, the pre-Nursing GPA, the grades in Semester I, II, III, and IV, the overall program average, and the program GPA. All of these were correlated at p=.00. The correlation between Psychology 260 and the other courses was as follows: Sociology 371 (r=.5), Psychology 261 (r=.5), the pre-Nursing average (r=.5), the average grades in Nursing I (r=.5) and Nursing II (r=.5), the Nursing I GPA (r=.5), the program average (r=.5), and the program GPA (r=.5); GPAs in Nursing 319 (r=.4) and Nursing II (r=.4), and grades in Fundamentals I (r=.4), Advanced Physiology (r=.4), Pharmacology (r=.4), and Nursing IV (r=.4). Nursing III had the lowest correlation with Psychology 260 (r=.3).

Sociology 371 was correlated with Psychology 261, Nursing 319, the pre-Nursing average, the pre-Nursing GPA, and grades in Semester I, II, III, and IV courses. All were correlated at p=.00. There was a strong

correlation with (a) the pre-Nursing GPA (r=.8), (b) the Nursing I GPA (r=.7) and the Nursing II average (r=.7 p=.00), and (c) averages in pre-Nursing (r=.6) and Nursing I (r=.6), the score in Fundamentals I (r=.6), Nursing II GPA (r=.6), and the program GPA (r=.6 p=.00). There was also a correlation between Sociology 371 and the GPAs in (a) Psychology 261 (r=.5), (b) Nursing 319 (r=.5), (c) Advanced Physiology (r=.5), Pharmacology (r=.5), and the program average (r=.5 p=.00). However, the grades in Nursing II, III, and IV reflected a lower correlation with the pre-Nursing GPA (r=.4).

There was a strong correlation between Psychology 261, the Nursing II average (r=.6) and the Nursing I GPA (r=.6), and the Pre-Nursing average (r=.6), the pre-Nursing GPA (r=.5), the Nursing I average (r=.5), and the Nursing II GPA (r=.5). However, correlations with grades in Pharmacology, Advanced Physiology, Fundamentals I, Nursing II, Nursing IV, and the program average and the program GPA were lower compared with other courses (r=.4). Correlations with Nursing 319 and Nursing III were the same (r=.3). However, all were correlated at p=.05.

The GPA in Nursing 319 showed different correlations at p=.00: (a) Fundamentals I and Nursing III, average scores in Nursing I and

Nursing II, GPAs in Nursing I and Nursing II, the program average, and the program GPA (r=.6); and (b) the pre-Nursing average, the pre-Nursing GPA, and the grades in Advanced Physiology, Nursing II, and Nursing IV (r=.5 p=.00). Pharmacology had the lowest correlation with Nursing 319 (r=.4).

There was a strong correlation between the pre-Nursing average and (a) the grade in Advanced Physiology (r=.9) and the Nursing I and Nursing II averages (r=.9); (b) Fundamentals I (r=.8) and the program average (r=.8); (c) the pre-Nursing GPA (r=.7), grades in Pharmacology (r=.7), Nursing II (r=.7) and the Nursing I GPA (r=.7); and (d) Nursing II GPA and the score in Nursing IV (r=.6). Nursing III and the program GPA also showed a strong correlation with the pre-Nursing average (r=.5). All of these were correlated at p=.00.

Scores in Semesters I, II, III, IV, the program average, and the program GPA were all examined for their correlation with the pre-Nursing GPA. All were correlated at p=.00 with the pre-Nursing GPA but their correlations varied: (a) Nursing I GPA (r=.9 p=.00); (b) the Nursing II GPA (r=.8); and (c) the Nursing II average, the program average, and program GPA (r=.7). But for most of the courses grades in Fundamentals I, Advanced Physiology, Nursing II, and Nursing IV, and

the Nursing I average, the correlation was lower but the significance level remained unaltered (r = .6); Pharmacology and Nursing III reflected a correlation r = .5 with the pre-Nursing GPA.

There was a perfect correlation between Fundamentals I and the Nursing II average (r = 1), but not between the Nursing I average (r = .9) and the program average (r = .9). There was also a strong correlation among the grades in Fundamentals I (r = .8), Advanced Physiology (r = .8), and Pharmacology (r = .8 p = .00), among the grades in Nursing II (r = .7), Nursing III (r = .7), and Nursing IV (r = .7), and among the Nursing I Nursing II and program GPAs (r = .6). All were correlated at p = .00.

Advanced Physiology was correlated with Pharmacology, the Nursing I average, the Nursing I GPA, Nursing II, the Nursing II average, the Nursing II GPA, Nursing III, Nursing IV, the program average, and the program GPA. All of these were correlated at p = .00. The average grades in (a) Nursing I (r = .9), Nursing II (r = .9), (b) the program average (r = .7), (c) grades in Pharmacology, Nursing II, Nursing IV and Nursing II GPA (r = .6), (d) Nursing I GPA, grade in Nursing III, and the program GPA (r = .5).

A Pearson correlation was utilized to examine the relationship among Pharmacology and the Nursing I average, the Nursing II average,

the Nursing I GPA, Nursing II, the Nursing II GPA, Nursing IV, and the program GPA. All were correlated at $p = .00$. The average scores in Nursing I and Nursing II showed the strongest correlation ($r = .8$); program average ($r = .6$); Nursing I ($r = .5$), Nursing II GPAs ($r = .5$), and the score in Nursing III ($r = .5$), whereas scores in Nursing II and Nursing IV, and the program GPA had the lowest correlation ($r = .4$).

The average grade in Nursing I was correlated with the Nursing I GPA, the grades in Semester I, II, III, and IV courses, the program average, and the program GPA. All of these were correlated at $p = .00$ but showed different correlations. A strong correlation existed with the Nursing II average and the program average ($r = .9$), and with the grade in Nursing II ($r = .8$). Other courses which showed a strong correlation were the Nursing I GPA, and the grade in Nursing IV ($r = .7$), the Nursing II GPA, the score in Nursing III, and the program GPA ($r = .6$).

Grades in Nursing II, Nursing III, Nursing IV, the Nursing II average, the Nursing II GPA, the program average, and the program GPA were correlated with the Nursing I GPA. All demonstrated correlations at $p = .00$ with different correlations in different courses. Program average and program GPA had the strongest correlation ($r = .7$). With respect to the Nursing II average, the Nursing II GPA, and the grade

in Nursing IV, the correlation was stronger but lower (r = .6); grades in Nursing II and Nursing III received the lowest correlation (r = .5).

Nursing II was correlated with the Nursing II average, the Nursing II GPA, Nursing III, Nursing IV, the program average, and the program GPA. All were correlated at p = .00. There was a perfect correlation with the Nursing II average (r = 1), but not with the program average (r = .9). However, the correlation was lower with the other courses: Nursing IV (r = .7); Nursing II GPA (r = .6); Nursing III and the program GPA (r = .5).

A Pearson correlation examined the Nursing II average with the Nursing II GPA, grades in Nursing III, Nursing IV, and the program average, and the program GPA. All of these were correlated at p = .00. A perfect correlation existed with the program average (r = 1 p = .00). However, there was a slight difference with the Nursing II GPA, Nursing IV (r = .8), Nursing III (r = .7), and the program GPA (r = .6).

The Nursing II GPA was computed for a Pearson correlation with the grades in Nursing III, and Nursing IV, the program average, and the program GPA. There was a strong correlation between (a) the Nursing II GPA and the program GPA (r = .7), (b) program average (r = .6), (c) Nursing IV (r = .5), and (d) Nursing III (r = .4). All were correlated at p = .00.

A Pearson correlation was used to examine the relationship among grades in Nursing III and Nursing IV, the program GPA, and the program average. All of these were correlated at p=.00. There was a different correlation between Nursing III and (a) the program average (r=.8), (b) Nursing IV (r=.7), and (c) the program GPA (r=.4).

Grades in Nursing IV were correlated with the program average (r=.9 p=.00) and the program GPA (r=.4 p=.00). A strong correlation existed between the program average and the program GPA (r=.6 p=.00).

The final part of the Pearson correlation examined the type of applicant (regular admission versus mature applicant). There was no strong correlation between the type of applicant and the academic grades. However, there was a statistically significant negative correlation between the type of applicant and the high school percentage (r=-.3 p=.00), and a very low correlation (r=.1-.2) with a significant value with the following: (a) high school GPA (p=.035), (b) Fundamentals I (p=.042), and (c) Nursing II (p=.012).

CHAPTER 5

Discussion and Conclusions

The purpose of the study was to ascertain whether or not a significant relationship existed among admissions criteria, socio-demographic characteristics, and success in a diploma nursing program. Operationally, success was defined as completion of a diploma program in nursing within 96 weeks of admission. For the purpose of the study, available information on two groups of students who had entered a school of nursing in Edmonton in September 1988 and January 1989 constituted the sample.

A list of students was obtained from the Registrar's Office, and each student was assigned a three-digit code number. To maintain their anonymity, the subjects' three-digit code numbers were utilized on all data collection sheets. All data appearing on the students' records were retrieved. According to the definition of success, of the 170 subjects in the sample, 139 completed the program within 96 weeks, 14 students withdrew from the program and did not return, 12 students took longer than 96 weeks to complete their program, and 5 students were still enroled at the time of data collection.

After data collection concluded, each subject's data were coded and entered in the computer. Using the Statistical Package for the Social Sciences (Spssx), descriptive statistics were run for all the variables. A median of all high school and nursing school scores was computed to determine the relationship between successful and unsuccessful groups on the chi-square test. A t-test was also computed to examine the differences between these two groups. Comparisons were made between students entering the program at different times. Socio-demographic information was tested for a potential relationship between successful and unsuccessful groups.

In the present study, health, personal, academic, and maternity reasons were cited for withdrawal from the nursing school. Those students who did not return had more personal reasons for their withdrawal compared to those who came back to complete their program. No personal reasons were reported in previous studies.

Students who entered the program in January 1989 cited withdrawal due to academic failure most frequently. Five students did not meet the required academic standard for re-examination. Several authors have also reported academic failure as a cause of withdrawal

from the program (Backman & Steindler, 1971; Munro, 1980; Rootkamp, 1968).

In this study, students who requested a maternity leave of absence as their reason for withdrawal returned later to complete the program. Yet, previous studies have not included maternity leave of absence among students' reasons for withdrawal.

Health was one of the reasons cited for withdrawal that was also reported in previous studies (Alichine et al., 1981; Backman et al., 1971; Reed et al., 1985; Rootkamp, 1968). Previous studies also discovered other reasons, such as a dislike of the subject, a dislike of the program, poor study habits, and difficulties experienced in adjusting to the school. But in this study students who withdrew cited only health, academic failure, personal matters, and pregnancy as reasons for withdrawal.

The chi-square test revealed no significant differences between regular and mature students, which is in direct contrast to the findings of the other researchers who reported that the successful candidates were the mature students (Jo Baker, 1975; Montgomery & Palmer, 1976). The difference in findings can be attributed to the fact that the present study defined mature students as those older than 21 years of age, whereas

previous studies limited their definition to those 26 years of age and older.

This study concurred with the findings of Allen et al. (1988), in that the students who had already earned their Bachelor's degree did not differ in terms of those who had not earned a Bachelor's degree or reported their academic credentials.

In this study, Alberta high school graduates were more successful compared to those who did not graduate from an Alberta high school, which is an interesting finding.

No significant relationship was found between high school scores and success in a nursing school program. However, a few authors have reported a significant relationship between success and grades in English (Clemence & Brink, 1978; Treich & Boss, 1987; Weinstein et al., 1980) and Math (Weinstein et al., 1980). The difference in findings can be attributed to the type of statistical analysis utilized. The present study used a median score for Chi-square tests, while the previous studies used the Pearson correlation.

This study did not support the findings of Allen et al. (1988) and Willingham (1974) that higher scores in high school correlated with higher scores in nursing school. The present study set the correlation at $r = .4$.

By contrast, other researchers used a low correlation ($r = .2$) to examine the relationship. Moreover, nursing school scores in the present study consisted of one score for each semester, whereas data from previous studies included scores for individual courses.

The high school scores of successful and unsuccessful groups on the t-test showed no significant differences. Successful and unsuccessful groups alike earned similar mean scores in English (71 and 72 respectively), Biology (75 and 72 respectively), and the prerequisite course percentage (72 and 73 respectively).

There was a significant relationship between GPAs in Microbiology, Psychology 260, and Sociology 371. Similar findings were also reported in a previous study of the relationship between success in nursing school and GPAs in Psychology (Clemence & Brink, 1978). However, previous studies have not studied a relationship between GPAs in Microbiology and Sociology and success in nursing school.

In Semester I, two students in Fundamentals I, one student in Advanced Physiology, and one student in Pharmacology failed. However, a significant relationship was found between grades in Fundamentals I and Advanced Physiology and success in the program. In Semester II, only one student failed in Nursing II. Nursing 319

(Developmental Assessment) showed a significant relationship with success. Finally, although grades in Nursing III (69%-92%, n=154) revealed a significant relationship with success, the same was not true for Nursing IV (62%-93%, n= 151). But one must be careful in drawing conclusions for Nursing III (p=.05). Furthermore, students who failed had already left the program.

There were two students who withdrew following admission. Three students withdrew at the end of pre-Nursing semester, five students withdrew at the end of Semester I, and four students withdrew at the end of Semester II.

Successful and unsuccessful groups showed significant differences on the t-tests for Microbiology, Sociology 371, Anatomy and Physiology, the pre-Nursing average, the pre-Nursing GPA, Fundamentals I, Advanced Physiology, Psychology 261, Pharmacology, Nursing 319, Nursing III, and the program average. Unsuccessful groups earned lower mean scores in these courses.

Students who entered nursing school at different times (September 1988 and January 1989) showed significant differences with respect to grades in Biology (76, 72), Chemistry (71, 67), Math (75, 72), the prerequisite course percentage (74, 71), Fundamentals I (73, 75),

Pharmacology (79, 71), and Nursing III (80, 78). However, those who were admitted in January 1989 achieved higher scores in Nursing II (73, 68) and Nursing IV (75, 73) than the September 1988 group.

Among high school scores, English, Biology, and the prerequisite course percentage are correlated with grades in the pre-Nursing semester and Semesters I, II, III, and IV at $r = .5$. English and Biology showed a significant correlation with only the prerequisite course percentage (English: $r = .5$ $p = .00$; Biology: $r = .7$). The prerequisite course percentage showed a similar correlation with Fundamentals I, Anatomy and Physiology, and Sociology 371 ($r = .5$ $p = .00$).

Among nursing school scores, Fundamentals I, Advanced Physiology, and the program average showed a strong correlation with Anatomy and Physiology ($r = .8$ $p = .00$), while the correlation with Pharmacology and Nursing IV was $r = .7$ ($p = .00$). Sociology 371, Nursing 319, and the program GPA all revealed a correlation with Pharmacology ($r = .5$ $p = .00$).

Microbiology demonstrated a correlation with the program GPA ($r = .6$ $p = .00$), while Sociology 371, Psychology 261, Fundamentals I, and the program average showed a correlation of only $r = .5$ ($p = .00$). Psychology 260 showed a stronger correlation with Fundamentals I and

the program GPA ($r = .6$ $p = .00$). Psychology 261, Nursing 319, Advanced Physiology, Pharmacology, and the program average all showed similar correlations with Psychology 260 ($r = .5$ $p = .00$). Course scores and GPAs were correlated ($p = .00$) with Nursing 319. Fundamentals I, Nursing III, the program average, and the program GPA all showed the same correlation with Nursing 319 ($r = .6$), while Advanced Physiology, Nursing II, and Nursing IV correlated at $r = .5$.

In Semester I, Fundamentals I had the strongest correlation with program average ($r = .9$), while Advanced Physiology and Pharmacology correlated at $r = .8$. Nursing II, III, and IV showed the same correlation with the program average ($r = .7$), while the correlation was different with program GPA ($r = .6$). Correlation between Pharmacology and the Program average was stronger ($r = .6$) compared to Nursing III ($r = .5$).

Nursing II showed the strongest correlation with program average ($r = .9$); it also correlated with Nursing IV ($r = .7$), Nursing III, and program GPA ($r = .5$). Nursing III was correlated with program average ($r = .8$) and Nursing IV ($r = .7$). Nursing IV demonstrated a positive correlation with program average ($r = .9$), while the correlation between program average and program GPA was $r = .6$ at $p = .00$.

Courses that were significantly related to success on the chi-square test were Microbiology, Sociology 371, Nursing 319 (Developmental Assessment), Fundamentals I, Advanced Physiology, and Nursing III. Finally, Fundamentals I and Nursing III were significantly related on both t-tests and the chi-square test. Using the Pearson correlation, courses that were significantly correlated among scores and the program average at $r = .9$ were Fundamentals I, Nursing II, and Nursing IV; Nursing III showed a correlation of only $r = .8$ with the program average.

Researchers have attempted to examine high school scores and socio-demographic data in relation to success in nursing programs. However, published studies have not described success in terms of the duration of a particular program, which led the researcher to examine whether or not there was a significant relationship among admissions criteria, socio-demographic characteristics, and success of students in a diploma nursing program. The present study defined success as graduation from a diploma nursing program within 96 weeks of admission.

This study was conducted in 1991 at one nursing school in Edmonton, Alberta, based on two classes of entering students. Students

entered the program as either regular or mature applicants. Each student was required to have high school credits for two mandatory courses (English and Biology), two recommended courses (from Math, Physics, Chemistry, and Science), and one optional course, with a minimum grade of 60% in each course. The Registrar of the school of nursing calculated percentage scores based on the five courses.

A list of students' names was obtained from the Registrar's office. Each subject was assigned a code number to maintain their anonymity. Data collection sheets were used to transcribe information from each student's record. All interval data, including high school and nursing school scores, were directly entered in the computer, while data concerning the type of applicant, each subject's job experience, his or her reason(s) for withdrawal, and his or her and previous qualifications were first coded and then entered in the computer. All data were checked and rechecked.

Data were analyzed using descriptive statistics, chi-square analysis, and t-tests, by (a) comparing the mean scores of prerequisite course percentages for returning and non-returning students, (b) comparing mean nursing school scores for returning and non-returning students and, finally, (c) doing cross tabulations and t-tests to examine

successful and unsuccessful in terms of high school and nursing school scores. Cross tabulations were also run against all socio-demographic data. In the cross tabulation, a median score was utilized to separate students who achieved high scores from those who earned low scores, despite the form of the grade, whether it was on a nine- point or a percentage scale. Based on the definition of success, cross tabulations were run for both high school and nursing school scores against the constructed variables of successful students, unsuccessful students, and those who withdrew from their programs. A t-test compared between the two entering classes in terms of high school and nursing school scores, and Pearson correlations were used to examine relationships among high school and nursing school grades. Of the 170 subjects in the sample, 157 were female and 13 were male. There were 67 regular and 99 mature applicants. Forty subjects had earned a Bachelor's degree while 28 subjects had some post-secondary education. Although their work experience varied, the sample included 11 registered nursing assistants and 14 nurses' aides.

Based on the definition of success, 139 subjects completed the program in 96 weeks, 12 took longer than 96 weeks, 14 withdrew from the program, and 5 were enroled in the program at the time of the study.

Analysis of the reasons students withdrew from the program revealed that those who were admitted in January 1989 cited more academic and personal reasons compared to those admitted in September 1988. Students who cited maternity reasons all completed the program.

The chi-square test revealed no significant association between success and socio-demographic data. However, there was a significant association for Alberta graduates.

In comparing the mean prerequisite course percentages for those who withdrew and returned to those who withdrew but did not return, students who returned had achieved higher scores in Biology, Chemistry, and Social Studies, while those who did not return earned higher scores in English, Math, and French.

University and nursing school course scores were also analyzed for both groups. Most of the students who withdrew did so at the end of the first semester. All students who did not return had earned low mean and median grades in nursing courses.

No significant association or difference was found between the successful and unsuccessful groups with respect to high school scores. On chi-square analysis, however, a significant association was

discovered between success and scores in Microbiology, Sociology 371, Psychology 260, Nursing 319, Fundamentals I, Advanced Physiology, and Nursing III. By contrast, scores in Microbiology and Psychology 260 were not significantly associated when run against successful and unsuccessful, and withdrew categories.

In summarizing the findings, the only courses which were significantly related on both the t-tests and the chi-square analysis were Fundamentals I and Nursing III.

There was a positive correlation between program average and Fundamentals I, Nursing II, and Nursing IV ($r = .9$) than with all other courses ($r = .4$-$.8$). But only two nursing courses were associated with success, a finding for which there is no ready explanation (Fundamentals I and Nursing III).

The investigator might have created a type II error in doing multiple t-tests. Moreover, because of the categorical dependent variable (period/week), regression analysis could not be carried out.

Recommendations For Research

1. It would be interesting to compare the reasons entering students have for selecting one term over another to begin nursing school.
2. Students should be encouraged to cite their reasons for withdrawal in their own words before leaving the program.
3. More information should appear in the student's admission record including (a) whether or not they were accepted for the first time, (b) their reasons for selecting a particular nursing school, (c) their source of financial support throughout their program, and (d) whether or not they resided close to the nursing school during the program.
4. A study of success in graduates' first nursing position should be planned for those who successfully complete the program and pass the licensure examination.
5. Record-keeping is important to any institution that requires standardized and consistent information for all students. Maintenance of consistent records is crucial to any study of student success. Provisions should be made to retain all graduates' records, including high school and socio-demographic information, for future study.

The Significance of the Research Study

This study did not reveal a significant relationship between high school marks and success in a nursing program. However, high school scores themselves are not the best predictors of success or failure. There are other factors to consider for those who took longer to complete the program or withdrew prior to completion. The significance of the present study's findings indicates that it is important to monitor the progress of the students believed to be at risk. This will also assist nurse educators to determine the types of students who will be successful in pursuing an academic path to professional nursing.

This study is also expected to provide descriptive information about the students who are expected to successfully completed their nursing programs. Students in this study had diverse educational backgrounds. Knowledge of their backgrounds will help to identify and verify existing nursing knowledge in clinical practice and thus contribute to improvements in the nursing service. And knowledge generated in clinical practice will also help to improve nursing education which will enhance service to society in terms of health promotion and illness prevention.

Admissions criteria were not found to be the best predictors of success in the present study. But these findings will encourage nurse educators to review and re-examine admissions criteria on a continuous basis. This study will be replicated in Nepal to determine if the admissions variables are associated with outcome variables in that setting.

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APPENDIX A

university of Alberta hospitals

8440 - 112 Street
Edmonton, Alberta
Canada T6G 2B7
(403) 492-8822

Mrs. Anju Sharma, MN Candidate
Faculty of Nursing, University of Alberta
7th Floor, Clinical Sciences Building
Edmonton, Alberta
T6G 2G3

Dear Mrs Sharma,

You have requested access to student records for the purpose of thesis data collection. This letter is to support that request and give you permission to access the records of the students graduating in December, 1990 and those who will graduate in April 1991 from the University of Alberta Hospitals School of Nursing.

The records for the December graduating class are available for your review once ethics clearance is presented. The records of the April, 1991 graduating class will be available, under the same terms after April 30, 1991.

Good luck with your thesis. If there is any additional information that you need, please feel free to contact me.

Sincerely,

Dana Hames Wertenberger

Dana Hames Wertenberger, PhD, R.N.,C
Director, University of Alberta Hospitals School of Nursing
Associate PROFESSOR, Faculty of Nursing, University of Alberta

Walter C. Mackenzie Health Sciences Centre

Aberhart Centre

Mewburn Veterans Centre

University Hospitals Outpatient Residence

University Hospitals Education and Development Centre

University Hospitals Patient Support Centre

3830-05774-Apr 89

APPENDIX B

University of Alberta
Edmonton
Canada T6G 2G3

Faculty of Nursing
3-120 Clinical Sciences Building

Certification of Ethical Acceptability for Research Involving Human Subjects

NAME OF APPLICANT: A. Sharma

NAME OF PROJECT: Relationship Between Admission and Success in a Diploma Program in Nursing

The members of the review committee, having examined the application for the above-named project, consider the procedures, as outlined by the applicant, to be acceptable on ethical ground for research involving human subjects.

Mar 15, 1991
Date

J. Lander
J. Lander, PhD.
Chair,
Ethics Review Committee

APPENDIX C

Data Collection Sheet 1

Code:

Age:

Alberta high school transcript: Yes No

If no, from where?

High school Transcript Data

1. English (%)
2. Biology (%)
3. Science (%) Not taken
4. Physics (%) Not taken
5. Chemistry (%) Not taken
6. Math (%) Not taken
7. Other: (Name) (%)
   (%)
   (%)
   (%)

High school GPA calculated from high school transcript:

Number of courses divided into total percentage scores:

Overall percentage high school grades:

Calculation of entering required course percentage from Registrar:

APPENDIX D

Data Collection Sheet 2

Nursing Application Form

1. Mr
   Mrs
   Miss

2. Sex: Male Female

3. Type of applicant: Regular Mature

4. Summary of work experience:
   RNA: Number of years
   Nursing Aide: Number of years
   Other:
   Number of years

9. Number of weeks in program:
   96 More than 96 Less than 96

10. Reasons for withdrawal prior to completion
    Withdrew: Yes No

11. Re-entered program:
    Yes How long No

APPENDIX E

Data Collection Sheet 3

Transfer or credits

Yes: Unit

No:

Pre-Nursing Semester

	Courses Taken	**Grades Received**
01.	Anatomy & Physiology	
02.	Medical Microbiology & Infectious Diseases	
03.	Psychology 260 (Basic Psychological Process)	
04.	Sociology 371 (Int. Sociology)	

Nursing Semester I

05.	Nursing 1: Nursing Fundamentals	
06.	Advanced Physiology	
07.	Pharmacology	
08.	Psychology 261 (Individual & Social Behaviour)	

Nursing Semester II

09.	Nursing II	
10.	Nursing 319 (Developmental Assessment)	

Nursing Semester III

11.	Nursing III	

Nursing Semester IV

12.	Nursing IV	

Program Average

Program GPA

APPENDIX F

Bachelor Degree

Sample = 40

1. Arts: 041, 058, 085, 091, 093, 095, 096, 102, 113, 132, 137, 140, 167

   Education: 011

   Childhood Education: 037

   Psychology: 038, 053

   Elementary Education: 166

   Linguistics: 076

   History: 082

   General Studies: 084

   Religious Studies: 154

2. Science General: 007, 086, 100, 109, 119, 127, 133, 134, 143, 151

   Biology: 050, 064, 066

   Science in Faculty Saint Jean: 009

   Mathematics: 027

   Chemistry: 170

   Arts and Science: 091

3. Medicine: 151

APPENDIX G

Post-secondary Education

Diploma in General studies: 168

Diploma in General arts and Science: 002, 038, 107

Diploma in Home Economics: 075

Diploma in Industrial Drafting: 075

Diploma in Social Science: 015

Medical Lab Technology: 133

Secretarial Studies-Medical: 028

Non-Medical: 032

Accelerated Accounting Program: 099

Diploma in Bible Studies: 036, 052

Dietary Technology: 104

Building Construction Technology: 003

Youth Development: 117

Biological Technology: 039

Marketing: 041

Medical Transcription: 043

Nursing Aide: 005

Medical Assistant: 060

Nursing Assistant: 016, 051, 060

Early childhood Development: 081

Bookkeeping: 101

Clerk/Typist: 078

Management Studies: 067

APPENDIX H

Work Experience

Accountant: 090, 097

Assistant Dietary Technician: 104

Assistant Administrator: 015, 032, 053, 098

Animal Caretaker: 021, 039

Assistant Graphic: 041

Assistant Librarian: 011, 020, 023, 040, 057, 077

Assistant Pharmacy: 002

Babysitter: 021, 029, 046, 065, 066, 069, 072, 083, 126, 157

Cashier: 007, 009, 010, 012, 021 022, 025, 034, 038, 044, 049, 058, 066, 068, 074, 085, 095, 098, 121, 125, 126, 132, 136, 137, 139, 160, 166

Counsellor: 052, 064, 117, 128

Clerk: 005, 017, 027, 028, 030, 038, 040, 056, 067, 085, 099,101, 105, 107, 114, 118, 129, 131, 144, 154, 155, 170

Collection Officer: 056

Coordinator: 120

Director: 109, 138

Draftsperson: 081

Driver: 105, 138, 142

Fisheries technologist: 092

Homemaker: 004, 106, 146, 082

Instructor: 007, 045, 052, 057, 061, 062, 064, 073, 085, 095, 107, 109, 119, 128, 132, 152

Janitor: 030, 085

Labour worker: 002, 018, 023, 029, 065, 079,094, 100, 121, 144, 152

Laboratory assistant: 130, 131, 169

Manager: 024, 025, 028, 032, 048, 062, 074, 075, 081, 086, 097, 107, 113, 123, 127, 152, 156

Medical transcriptionist: 043

Missing: 047, 055, 059, 087, 091, 108, 124, 163, 164

Nursing Aide: 003, 005, 014, 033, 042, 048, 058, 059, 067, 068, 078, 082, 086, 130

Painter: 053

Paramedic: 111

Personal Director: 001

Photocopy person: 008

Physician: 151

Postman: 165

Ranch band: 046

Ranger: 102

Receptionist: 020, 072, 076, 088, 093, 104, 159, 169

Registered Nursing Assistant: 013, 016, 051, 058, 063, 071, 103, 145, 153, 161, 168

Salesperson: 003, 004, 007, 031, 044, 053, 066, 069, 070, 075, 076, 112, 115, 119, 121, 132, 133, 135, 140, 141, 142, 143, 147, 148, 149, 150, 157, 158, 162, 165, 167

Secretary: 081, 112, 116

Slide attendant: 035

Supervisor: 090, 134

Teacher's helper: 006, 036

Unknown work: 026, 037

Volunteer: 054, 063, 064, 079, 089, 106, 112, 127, 086

Waitress: 006, 008, 010, 012, 019, 027, 036, 038, 040, 044, 045, 046, 050, 052, 054, 066, 071, 076, 077, 078, 080, 082, 089, 092, 096, 100, 102, 104, 110, 122, 129, 134, 135, 139, 143, 150

APPENDIX I

A Pearson Correlation Matrix Among Courses

	01	02	03	04	05	06	07	08	09	10	11	12	13	14
01		.1	.1	.1	.1	.3	.3	.5	.1	.2	.1	.2	.2	.3
02			.5	.4	.2	.2	.3	.7	.4	.2	.2	.3	.2	.2
03				.6	.6	.5	.5	.7	.5	.0	.2	.2	.0	.1
04					.3	.3	.4	.6	.3	.1	.1	.2	.0	.1
05						.2	.3	.4	.2	.0	.1	.1	.0	.0
06							.9	.5	.3	.2	.1	.3	.1	.2
07								.6	.4	.2	.1	.3	.1	.2
08									.5	.3	.2	.5	.3	.3
09										.4	.4	.5	.3	.5
10											.4	.5	.5	.4
11												.5	.5	.4
12													.5	.5
13														.3
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28														

APPENDIX I

A Pearson Correlation Matrix Among Courses, Continued

	15	16	17	18	19	20	21	22	23	24	25	26	27	28
01	.1	.3	.2	.1	.1	.2	.2	.2	.3	.4	.2	.2	.2	.1
02	.5	.3	.4	.4	.3	.5	.3	.3	.5	.3	.2	.2	.3	.2
03	.6	.5	.4	.3	.2	.6	.1	.3	.6	.2	.2	.3	.4	.1
04	.3	.1	.2	.3	.2	.2	.1	.1	.2	.0	.1	.1	.2	.1
05	.3	.3	.2	.2	.2	.3	.2	.1	.4	.6	.0	.1	.1	.1
06	.3	.4	.3	.2	.1	.4	.4	.2	.4	.4	.2	.3	.3	.1
07	.4	.4	.3	.3	.2	.4	.4	.2	.4	.4	.2	.2	.3	.2
08	.5	.5	.5	.4	.4	.6	.4	.3	.6	.4	.3	.3	.4	.3
09	1	.7	.8	.8	.6	.9	.6	.6	.9	.6	.5	.6	.8	.5
10	.5	.7	.5	.4	.3	.4	.6	.4	.5	.7	.4	.4	.5	.6
11	.5	.6	.4	.4	.4	.5	.5	.4	.5	.4	.3	.4	.5	.5
12	.6	.8	.6	.5	.5	.6	.7	.4	.7	.6	.4	.4	.5	.6
13	.5	.5	.4	.4	.4	.5	.6	.4	.6	.5	.3	.4	.4	.4
14	.5	.5	.6	.5	.4	.6	.6	.5	.6	.6	.6	.5	.6	.6
15		.7	.8	.9	.7	.9	.7	.7	.9	.6	.5	.6	.8	.5
16			.6	.6	.5	.6	.9	.6	.7	.8	.5	.6	.7	.7
17				.8	.8	.9	.6	.7	1	.6	.7	.7	.9	.6
18					.6	.9	.5	.6	.9	.6	.5	.6	.7	.5
19						.8	.5	.4	.8	.5	.5	.4	.6	.4
20							.7	.8	.9	.6	.6	.7	.9	.6
21								.5	.6	.6	.5	.6	.7	.7
22									1	.6	.5	.7	.9	.5
23										.8	.7	.8	0	.6
24											.4	.5	.6	.7
25												.7	.8	.4
26													.9	.4
27														.6
28														

APPENDIX I

A Pearson Correlation Matrix Among Courses, Continued

01 English
02 Biology
03 Physics
04 Chemistry
05 Mathematics
06 HSGPA
07 HS%
08 Prerequisite Course %
09 Anatomy & Physiology
10 Microbiology
11 Psychology 260
12 Sociology 371
13 Psychology 261
14 Nursing 319
15 Pre-Nursing Average
16 Pre-Nursing GPA
17 Fundamental I
18 Advanced Physiology
19 Pharmacology
20 Nursing I Average
21 Nursing I GPA
22 Nursing I
23 Nursing II Average
24 Nursing II GPA
25 Nursing III
26 Nursing IV
27 Program Average
28 Program GPA